No. 200700390

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Oklahoma Agricultural Experiment Station (OAES)

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR PORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE E PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT ED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET

WHEAT, COMMON

'Centerfield'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this seventh day of December, in the year two thousand and seven.*

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions*

Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
Oklahoma Agricultural Experiment Station (OAES)

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
OK03918C

3. VARIETY NAME
Centerfield

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Oklahoma State University
139 Ag Hall
Stillwater, OK 74078

5. TELEPHONE *(include area code)*
405-744-5398

6. FAX *(include area code)*
405-744-5339

FOR OFFICIAL USE ONLY

PVPO NUMBER
#200700390

FILING DATE
JULY 26, 2007

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
Public university

8. IF INCORPORATED, GIVE STATE OF INCORPORATION

9. DATE OF INCORPORATION

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*
Dr. Clarence Watson
Assoc. Director - OAES
Oklahoma State University
139 Ag Hall
Stillwater, OK 74078

FEES RECEIVED
FILING AND EXAMINATION FEES:
$ 4,382.00
DATE 7/26/07
CERTIFICATION FEE:
$ 768.00
DATE 9/21/07

11. TELEPHONE (Include area code)
405-744-5398

12. FAX (Include area code)
405-744-5269

13. E-MAIL
c.watson@okstate.edu

14. CROP KIND *(Common Name)*
Hard red winter wheat

16. FAMILY NAME *(Botanical)*
Poaceae

15. GENUS AND SPECIES NAME OF CROP
Triticum aestivum

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☑ NO

18. DOES THE VARIETY CONTAIN ANY TRANSGENES? ***(OPTIONAL)***
☐ YES ☑ NO

IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERICALIZATION. _____

19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED
(Follow instructions on reverse)

a. ☑ Exhibit A. Origin and Breeding History of the Variety
b. ☑ Exhibit B. Statement of Distinctness
c. ☑ Exhibit C. Objective Description of Variety
d. ☐ Exhibit D. Additional Description of the Variety *(Optional)*
e. ☑ Exhibit E. Statement of the Basis of the Owner's Ownership
f. ☑ Exhibit F. Declaration Regarding Deposit
g. ☑ Voucher Sample *(3,000 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
h. ☑ Filing and Examination Fee ($4,382), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)*
☑ YES *(If "yes", answer items 21 and 22 below)* ☐ NO *(If "no", go to item 23)*

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES?
☑ YES ☐ NO
IF YES, WHICH CLASSES? ☑ FOUNDATION ☑ REGISTERED ☑ CERTIFIED

22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☑ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS.
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☑ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☑ YES ☐ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER
Clarence Watson by Sheila Julian

NAME *(Please print or type)*
Dr. Clarence Watson

CAPACITY OR TITLE
Assoc. Director - OAES

DATE
6-26-07

SIGNATURE OF OWNER

NAME *(Please print or type)*

CAPACITY OR TITLE

DATE

(See reverse for instructions and information collection burden statement)

GENERAL INSTRUCTIONS: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E, F; (3) for a tuber reproduced variety, verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; and (4) payment by credit card or check drawn on a U.S. bank for $4,382 ($518 filing fee and $3,864 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice).* **NEW:** With the application for a seed reproduced variety **or by direct deposit soon after filing**, the applicant must provide at least 3,000 viable untreated seeds of the variety *per se*, and for a hybrid variety at least 3,000 untreated seeds of each line necessary to **reproduce** the variety. Partial applications will be held in the PVPO for not more than 90 days; then returned to the applicant as un-filed. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a payment by credit card or check payable to "Treasurer of the United States" in the amount of $768 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

Plant Variety Protection Office
Telephone: (301) 504-5518 **FAX:** (301) 504-5291
General E-mail: PVPOmail@usda.gov
Homepage: http://www.ams.usda.gov/science/pvpo/PVPindex.htm

#200700390

SPECIFIC INSTRUCTIONS:
To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and **provide evidence** that the permanent name of the application variety (even if it is a parental, inbred line) has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: U.S. Department of Agriculture, Agricultural Marketing Service, Livestock and Seed Programs, **Seed Regulatory and Testing Branch**, 801 Summit Crossing Place, Suite C, Gastonia, North Carolina 28054-2193 Telephone: (704) 810-8870. http://www.ams.usda.gov/lsg/seed.htm.

ITEM

19a. Give:
(1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach replicated statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

20. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

23. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

24. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

22. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

23. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

September 21, 2006 - Foundation seed sold for seed increase by Oklahoma Foundation Seed Stocks, Inc.

24. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

USA, issued 11/29/1994, patent number 5,369,022

200700390

Exhibit A – Breeding History ***Centerfield HRW wheat***

Origination and Breeding Procedure

Centerfield is an F_2-derived line currently in the F_9 generation (2006-2007 crop year). It was selected from the single cross, (TXGH12588-105*4/FS4)/2*2174. The experimental line TXGH12588-105 was eventually released as 'TAM 110' in 1996 by the Texas Agric. Exp. Stn. It served as the recurrent parent in a backcrossing program conducted by scientists at Texas A&M University to introgress the *AhasL-D1* gene from a mutant selection, FS4, of the French wheat cultivar, Fidel. This gene resides on the long arm of chromosome 6D and confers resistance to the imidazolinone herbicide, imazamox, that is absent in wild-type (non-mutated) wheat. Under a material-transfer agreement between Oklahoma State University and American Cyanamid Co., Dr. Tom Peeper acquired F_2 seedstock with the pedigree TXGH12588-105*4/FS4 in the fall of 1996. Single plants were selected in the greenhouse in the seedling stage for survival to a commercial rate (1x=5 oz ac^{-1}, or 18 g ai ha^{-1}) of imazamox. Several survivors were crossed with HBZ374C, a HRW wheat line eventually released by OSU in 1997 as '2174'. The F_1 hybrid was backcrossed to 2174 in 1998, producing BC_1F_1 seed with the cross number, 98cx140.

The BC_1F_1 plant generation (about 10 plants) was grown in the greenhouse at Stillwater in 1999 and harvested in bulk. In 2000, the F_2 generation was advanced in the field at Stillwater and treated in March 2000 with a 2x commercial rate of imazamox. Single heads were harvested from surviving plants. Centerfield traces to a single $BC_1F_{2:3}$ head row selected at Stillwater in 2001 on the basis of tolerance to a 2x commercial rate of imazamox, plant and head type, maturity, and kernel size and uniformity. The $F_{2:4}$ head-row progeny was then evaluated in the 2002 Dual-Purpose Observation Nursery using an augmented experimental design at Stillwater (dual-purpose management system) and Lahoma (grain-only system). This nursery, with exception of the replicated checks, was treated with imazamox (6 oz ac^{-1}) on 15 March 2002. Compared with untreated neighboring plots of the check cultivar Ok101, Centerfield showed exceptional stay-green potential of the flag leaf, a 6 bu/ac yield advantage and a test weight advantage of 1 lb/bu, a hardness index of 69 units (+16 units), and a wheat protein content of 13.7% (+0.5 percentage units).

From 2002 to 2005, Centerfield was tested as **OK03918C** in the following replicated yield trials, representing 49 site-years in Oklahoma plus additional sites in neighboring states:

Replicated Yield Trials 1 (RYT1-IMI)	2002-2003
Oklahoma Elite Nursery 1 (OET1-IMI)	2003-2004
Oklahoma Elite Nursery 2 (OET2)	2004-2005
BASF Qualification Trials	2004-2005

Dr. Brett Carver was responsible for the breeding and evaluation of Centerfield from 1996 to present. End-use quality was externally examined by the USDA-ARS Hard Winter Wheat Quality Laboratory (HWWQL) in Manhattan, KS and was entered in the 2005 Hard Winter Wheat Milling and Baking Evaluation Program sponsored by the

Wheat Quality Council. The BASF Qualification Trials, conducted according to CLEARFIELD Wheat Variety Qualification Protocol W-21, affirmed the required level of commercial tolerance to imazamox herbicide for commercialization of Centerfield. A restricted release consistent with terms agreed upon by BASF and the Oklahoma Agric. Exp. Stn. has been accomplished.

OK03918C was officially released as 'Centerfield' by the Oklahoma Agric. Exp. Stn. and the USDA-ARS in 2006. Foundation seed will be produced and distributed by the Oklahoma Foundation Seed Service, Inc.

Breeder Seed Increase

Breeder-seed multiplication and off-type removal occurred in 2004 and 2005 at Goodwell, OK and Yuma, AZ, respectively. The 2005 increase produced approximately 100 bu breeder seed, from which about 6 bu of cleaned seed were planted for foundation seed production during the 2005-2006 crop year.

Type of variants

Adult plants of Centerfield have been observed to be uniform and stable for three generations over a 3-yr period from 2004 to 2006. No phenotypically distinguishable variants or off-types were observed, including reaction to a commercial rate of imazamox.

Name Check

As customary for all wheat variety releases by Oklahoma State University, name clearance was provided as a service of the USDA. Mr. Kevin Robinson, Seed Marketing Specialist of the Seed Regulatory and Testing Branch, Agric. Marketing Service, provided name clearance for 'Centerfield' on 16 February 2006, as documented in the attached letter.

Exhibit B – Statement of Distinctness ***Centerfield HRW wheat***

Most Similar Varieties

Centerfield most closely resembles the HRW wheat cultivars, Okfield and 2174. While Centerfield was developed through a single backcross to 2174, which comprises 75% of the parentage, Okfield resulted from a single cross with 2174 (50% of the parentage), and with a slightly different donor parent of the imazamox-resistance gene, *AhasL-D1*. Centerfield resembles 2174 in juvenile and adult plant growth, disease resistance, and test weight patterns. Centerfield resembles Okfield, not only in its resistance to imazamox herbicide, but also in juvenile plant growth, stay-green ability of the flag leaf, and maturity.

Distinctness of Centerfield versus Okfield will be drawn in two key areas: 1) genotype for high-molecular-weight glutenin subunit (HMW-GS) composition, and 2) resistance to wheat soilborne mosaic virus.

Distinctness of Centerfield versus 2174 will be drawn in three key areas: 1) genotype for imazamox herbicide resistance, 2) genotype for greenbug resistance, 3) genotype for HMW-GS composition.

Supportive Data to Declare Distinctness

Centerfield versus Okfield

1. High-molecular-weight glutenin subunit composition

   Based on 10% one-dimensional SDS-PAGE, the combined high-molecular-weight glutenin subunit composition (HMW-GS) at loci *Glu-A1*, *Glu-B1*, and *Glu-D1* for Centerfield is 2*, 7+8, 2+12 (data provided by Dr. Patricia Rayas, Oklahoma State University, 2006). Centerfield has the same subunit composition as that identified previously for one of its parents, TAM 110, by Shan et al. (J. Cereal Sci., 2007, 45:199-208). The HMW-GS composition for Okfield, according to Shan et al. (2007), is 2*, 6*+8*, 2+12/3+12. The Glu-B1 subunits 6*+8* occur in low frequency among Great Plains varieties and differ only slightly in electrophoretic mobility from subunits 6+8.

2. Resistance to wheat soilborne mosaic virus

   Centerfield exhibits a resistant reaction to *Wheat soilborne mosaic virus*. Okfield exhibits a highly susceptible reaction that appears symptomatically as prominent yellow mosaic areas on plants in February and March (Feekes growth stages 4, 5, 6) in Oklahoma (Compendium of Wheat Diseases, 2nd ed., p. 78).

Centerfield versus 2174

1. Genotype for imazamox herbicide resistance

Centerfield is homozygous for the *AhasL-D1* gene which confers resistance to a labeled rate of imazamox and which was derived by mutagenesis of the French wheat cultivar, Fidel. FS4 was the donor mutant line. 2174 does not contain this gene (wild-type genotype).

2. Genotype for greenbug resistance

2174 contains no genes for greenbug resistance, whereas Centerfield possesses the *Gb3* gene which confers resistance to biotypes E and I at a frequency of 46% (i.e., 46% of the plants in Centerfield are resistant to both biotypes). Biotypes E and I are the two most predominant biotypes in the southern Great Plains (data provided by Dr. David Porter, USDA-ARS, Stillwater, OK).

3. High-molecular-weight glutenin subunit composition

Based on 10% one-dimensional SDS-PAGE, the combined HMW-GS composition at loci *Glu-A1*, *Glu-B1*, and *Glu-D1* for 2174 is 2*, 6*+8*, 5+10 (Shan et al., 2007, J. Cereal Sci. 45:199-208). As mentioned previously, the HMW-GS composition for Centerfield is 2*, 7+8, 2+12 (data provided by Dr. Patricia Rayas, Oklahoma State University, 2006).

Other Descriptive Informatation

Agronomic attributes

Based on field readings of emergence under early-planted conditions, Centerfield shows strong high-temperature sensitivity similar to 2174, Ok102, Okfield, and Overley. On a scale of 1 (accelerated germination) to 5 (delayed germination), its score is about 4. Stand establishment will likely be delayed for Centerfield when planted extremely early or in hot soils compared with rapidly emerging cultivars such as Jagger, Ok101, and OK Bullet.

As a juvenile plant, Centerfield exhibits a semi-erect growth habit (slightly more erect than Ok101 but less erect than 2174) and a coarse leaf texture (similar to Jagalene and Overley but more coarse than AP502CL. Based on tissues collected in 2006 at Stillwater, Centerfield reached the first-hollow-stem (FHS) stage on the same day as Okfield but six days later than AP502CL. It will be classified as having moderately late arrival to FHS stage.

Centerfield reaches the heading stage about the same time as non-Clearfield cultivars with intermediate maturity. AP502CL is one of the earliest hard winter wheat cultivars, and it reached heading 5 d earlier than Centerfield, which is still 2 d earlier than Okfield.

Centerfield is a moderately tall semidwarf wheat, or intermediate to AP502CL (2 cm shorter) and Okfield (2 cm taller). Its straw strength and lodging resistance is most similar to 2174, making it superior to current cultivars with imazamox resistance. Centerfield is moderately tolerant to acidic soils. On a scale of 1 (tolerant) to 5 (highly

susceptible) under critically low pH and high aluminum toxicity, Centerfield has scored 2.1, which places it in a category less tolerant than Endurance (score=1.3) but substantially more tolerant than AP502CL (score=4.8). This level of tolerance allows Centerfield to be positioned in central areas of Oklahoma where current Clearfield cultivars are not recommended.

Disease and insect reactions

Disease or insect	Reaction
Leaf rust (adult-plant)	Resistant (current races in TX, OK)
Leaf rust (seedling)	Susceptible (current races in OK)
Stripe rust (adult plant)	Moderately resistant
Stripe rust (seedling)	Susceptible (highly virulent race from KS)
Wheat soilborne mosaic	Resistant
Wheat spindle streak mosaic virus	Resistant
Septoria leaf blotch	Moderately susceptible
Tan spot	Susceptible
Powdery mildew (adult-plant)	Moderately resistant
Greenbug (biotypes E, I)	Heterogeneous (46% resistant: 54% susceptible)
Hessian fly (field reaction)	Intermediate (similar to 2174)
Russian wheat aphid (biotypes 1, 2)	Susceptible

Milling and baking attributes

Across 14 Oklahoma environments from 2003 to 2005, Centerfield averaged 30.8 mg kernel weight and 2.43 mm kernel diameter, compared with 30.2 mg and 2.28 mm for AP502CL. During the severe infection of stripe rust in 2005, kernel size remained constant for Centerfield, whereas kernel weight and diameter decreased about 6 mg and 0.30 mm, respectively, for AP502CL, a more susceptible cultivar. Kernel texture is moderately hard, based on a SKCS hardness score of 71 for Centerfield. Centerfield has moderately high wheat protein content (13.0% at 12% m.b.).

Three years of mixograph evaluation produced the following values, with targeted values indicated in parentheses: 4.2 min corrected mixing time (3 to 7 min), mixing tolerance rating of 2.9 on a 0-to-6 scale (>2), mixogram curve width of 13.9 mm at 2 min past peak development (>10.0 mm), and a mixograph stability index of 8.8 (<10.0). From a one-year composite evaluation of nine nursery samples collected statewide in 2005, the USDA-ARS-HWWQL (Manhattan, KS) reported 62.8% flour yield at 0.34% flour ash, 13.1% wheat protein, mixing tolerance rating of 2 on a 0-to-6 scale, 61.9% bake absorption, 3.8 min bake time, 908 cc pup-loaf volume, 70.5 loaf volume regression value, and 2.3 crumb grain score (0-to-6 scale of undesirable to desirable). All scores were similar to the mean of four check cultivars comprised of Okfield, OK Bullet, Deliver, and Endurance, except for lower flour yield and crumb grain score for Centerfield.

Area of adaptation

Centerfield is widely adapted to Oklahoma and combines into one cultivar the primary adaptation zones ascribed to Okfield (western Oklahoma) and 2174 (central

Oklahoma). It will be primarily positioned for the north central and central portions of the state prone to acquire wheat soilborne mosaic and spindle streak mosaic virus and low–pH areas prone to aluminum toxicity. Centerfield extends well into south central Kansas.

Cooperating scientists

Development of this cultivar was accomplished by Oklahoma State University's Wheat Improvement Team and USDA-ARS: Brett Carver, Robert Hunger, Jeff Edwards, David Porter (USDA-ARS Wheat, Peanut, and Other Field Crops Research Unit, Stillwater, OK), Patricia Rayas-Duarte, Art Klatt, Liuling Yan, and Bjorn Martin. Others instrumental in its development and evaluation were Brad Seabourn, USDA-ARS-Grain Structure and Quality Research Unit (Manhattan, KS) and Guihua Bai, USDA-ARS Plant Science and Entomology Research Unit (Manhattan, KS).

REPRODUCE LOCALLY. Include form number and date on all reproductions. Form Approved OMB NO 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

Exhibit C

OBJECTIVE DESCRIPTION OF VARIETY
Wheat (*Triticum* spp.)

NAME OF APPLICANT (S)	TEMPORARY OR EXPERIMENTAL DESIGNATION	VARIETY NAME
Oklahoma Agricultural Experiment Station (OAES)	OK03918C	Centerfield

ADDRESS *(Street and No. or RD No., City, State, Zip Code and Country)*
Oklahoma State University
139 Ag Hall
Stillwater, OK 74078

FOR OFFICIAL USE ONLY

PVPO NUMBER
#200700390

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g., [0][9][9] or [0][9]) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used: _____. Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

[1]
1 = Common
2 = Durum
3 = Club
4 = Other (Specify) _____

2. VERNALIZATION:

[2]
1 = Spring
2 = Winter
3 = Other (Specify) _____

3. COLEOPTILE ANTHOCYANIN:

[1] 1 = Absent 2 = Present

4. JUVENILE PLANT GROWTH:

[2] 1 = Prostrate 2 = Semi-Erect 3 = Erect

5. PLANT COLOR: (boot stage)

[3]
1 = Yellow-Green
2 = Green
3 = Blue-Green

6. FLAG LEAF: (boot stage)

[2] 1 = Erect 2 = Recurved
[1] 1 = Not Twisted 2 = Twisted
[1] 1 = Wax Absent 2 = Wax Present

7. EAR EMERGENCE:

[1][1][8] Number of Days (Average)

[ ][1] Number of Days Earlier Than * TAM 111

Same As * GUYMON, DUSTER

[ ][2] Number of Days Later Than * OK BULLET

*Relative to a PVPO-Approved Commercial Variety Grown in the Same Trial

8. ANTHER COLOR:

[1] 1 = Yellow 2 = Purple

9. PLANT HEIGHT: (from soil to top of head, excluding awns) (GREENHOUSE)

[8 1] cm (Average)

[7] cm Taller Than 2174 *

Same As ENDURANCE *

[8] cm Shorter Than OK BULLET *

10. STEM:

A. ANTHOCYANIN

[1] 1 = Absent 2 = Present

B. WAXY BLOOM

[2] 1 = Absent 2 = Present

C. HAIRINESS (last internode of rachis)

[1] 1 = Absent 2 = Present

D. INTERNODE

[1] 1 = Hollow 2 = Semi-Solid 3 = Solid

[4] Number of Nodes

E. PEDUNCLE

[1] 1 = Erect 2 = Recurved 3 = Semi-Erect

[1 1] cm Length

F. AURICLE

[1] Anthocyanin: 1 = Absent 2 = Present

[1] Hair: 1 = Absent 2 = Present

11. HEAD: (At Maturity)

A. DENSITY

[2] 1 = Lax
2 = Middense (Laxidense)
3 = Dense

B. SHAPE

[2] 1 = Tapering
2 = Strap
3 = Clavate
4 = Other (Specify) _____

C. CURVATURE

[2] 1 = Erect
2 = Inclined
3 = Recurved

D. AWNEDNESS

[4] 1 = Awnless
2 = Apically Awnletted
3 = Awnletted
4 = Awned

12. GLUMES: (At Maturity)

A. COLOR

[1] 1 = White
2 = Tan
3 = Other (Specify) _____

B. SHOULDER

[4] 1 = Wanting 2 = Oblique
3 = Rounded 4 = Square
5 = Elevated 6 = Apiculate
7 = Other (Specify) _____

C. SHOULDER WIDTH

[2] 1 = Narrow
2 = Medium
3 = Wide

D. BEAK

[3] 1 = Obtuse
2 = Acute
3 = Acuminate

E. BEAK WIDTH

[2] 1 = Narrow
2 = Medium
3 = Wide

F. GLUME LENGTH

[3] 1 = Short (ca. 7 mm)
2 = Medium (ca. 8 mm)
3 = Long (ca. 9 mm)

G. WIDTH

[2] 1 = Narrow (ca. 3 mm)
2 = Medium (ca. 3.5 mm)
3 = Wide (ca. 4 mm)

H. PUBESCENCE

[1] 1 = Not Present
2 = Present

13. SEED:

A. SHAPE

[3] 1 = Ovate
2 = Oval
3 = Elliptical

B. CHEEK

[1] 1 = Rounded
2 = Angular

C. BRUSH

[3] 1 = Short
2 = Medium
3 = Long

[2] 1 = Not Collared
2 = Collared

D. CREASE

[1] 1 = Width 60% or less of Kernel
2 = Width 80% or less of Kernel
3 = Width Nearly as Wide as Kernel

[1] 1 = Depth 20% or less of Kernel
2 = Depth 35% or less of Kernel
3 = Depth 50% or less of Kernel

E. COLOR

[3] 1 = White
2 = Amber
3 = Red
4 = Other (Specify) _____

F. TEXTURE

[1] 1 = Hard
2 = Soft
3 = Other (Specify) _____

G. PHENOL REACTION (See Instructions)

[0] 1 = Ivory
2 = Fawn
3 = Light Brown
4 = Dark Brown
5 = Black

H. SEED WEIGHT

[43] g/1000 Seed (whole number only) -GREENHOUSE

I. GERM SIZE

[2] 1 = Small
2 = Midsize
3 = Large

14. DISEASE: PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

(0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant)

[0]	Stem Rust (*Puccinia graminis* f. sp. *tritici*)	[2]	Leaf Rust (*Puccinia recondita* f. sp. *tritici*)
[3]	Stripe Rust (*Puccinia striiformis*)	[0]	Loose Smut (*Ustilago tritici*)
[1]	Tan Spot (*Pyrenophora tritici-repentis*)	[0]	Flag Smut (*Urocystis agropyri*)
[0]	Halo Spot (*Selenophoma donacis*)	[0]	Common Bunt (*Tilletia tritici* or T. *laevis*)
[0]	*Septoria nodorum* (Glume Blotch)	[0]	Dwarf Bunt (*Tilletia controversa*)
[0]	*Septoria avenae* (Speckled Leaf Disease)	[0]	Karnal Bunt (*Tilletia indica*)
[1]	*Septoria tritici* (Speckled Leaf Blotch)	[2]	Powdery Mildew (*Erysiphe graminis* f. sp. *tritici*)
[0]	Scab (*Fusarium* spp.)	[0]	"Snow Molds"
[0]	"Black Point" (Kernel Smudge)	[0]	Common Root Rot (*Fusarium*, *Cochliobolus* and *Bipolaris* spp.)
[3]	Barley Yellow Dwarf Virus (BYDV)	[0]	Rhizoctonia Root Rot (*Rhizoctonia solani*)
[2]	Soilborne Mosaic Virus (SBMV)	[0]	Black Chaff (*Xanthomonas campestris* pv. *translucens*).
[2]	Wheat Yellow (Spindle Streak) Mosaic Virus	[0]	Bacterial Leaf Blight (*Pseudomonas syringae* pv. *syringae*)
[0]	Wheat Streak Mosaic Virus (WSMV)	[ ]	Other (Specify) _____
[ ]	Other (Specify) _____	[ ]	Other (Specify) _____
[ ]	Other (Specify) _____	[ ]	Other (Specify) _____
[ ]	Other (Specify) _____	[ ]	Other (Specify) _____

15. INSECT: (0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant)

PLEASE SPECIFY BIOTYPE (where needed)

[3]	Hessian Fly (*Mayetiola destructor*)	[ ]	Other (Specify) _____
[0]	Stem Sawfly (*Cephus* spp.)	[ ]	Other (Specify) _____
[0]	Cereal Leaf Beetle (*Oulema melanopa*)	[ ]	Other (Specify) _____

15. INSECT: (continued) (0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant)

PLEASE SPECIFY BIOTYPE (Where Needed)

[1]	Russian Aphid (*Diuraphis noxia*)	[ ]	Other (Specify) _____
[3]	Greenbug (*Schizaphis graminum*)	[ ]	Other (Specify) _____
[0]	Aphids	[ ]	Other (Specify) _____

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS:

WHEAT DESCRIPTOR ILLUSTRATIONS

Section Numbers Correspond to the Numbers of the Sections on the Form

#200700390

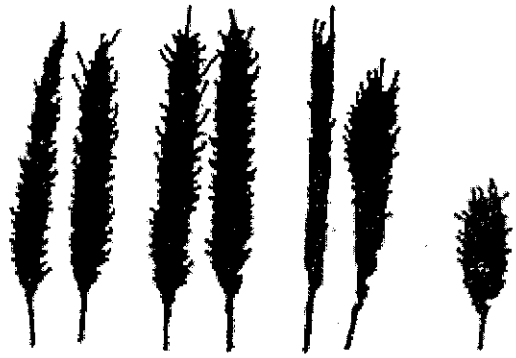
4. EARLY PLANT GROWTH HABIT:

1 Prostrate 2 Intermediate 3 Erect

10. (D.) STEM INTERNODE X-SECTION:

1 Hollow 2 Semi-solid 3 Solid

11. (B.) SPIKE SHAPE:

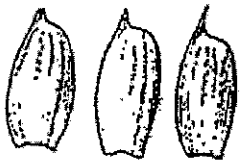


1 Tapering 2 Oblong 3 Clavate 4 Elliptical

11. (D.) AWNEDNESS:

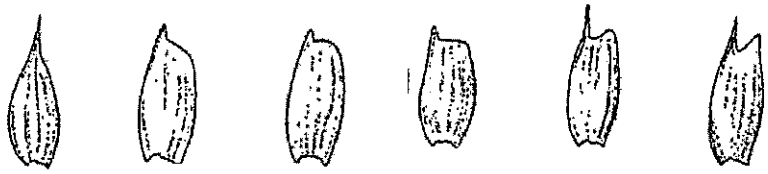
1 Awnless 2 Apically Awnleted 3 Awnleted 4 Awned

12. (D.) BEAK SHAPE:



1 Obtuse 2 Acute 3 Acuminate

12. (C.) SHOULDER SHAPE:



1 Wanting 2 Oblique 3 Rounded 4 Square 5 Elevated 6 Apiculate

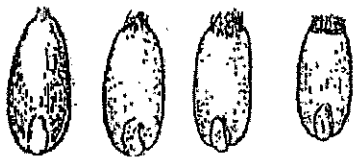
13. (A.) SEED SHAPE:

1 Ovate 2 Oval 3 Elliptical

13. (B.) CHEEK SHAPE:

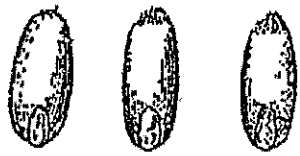
1 Rounded 2 Angular

13. (C.) BRUSH SIZE



1 Small 2 Midsized 3 Large 4 Collared

13. (C.) BRUSH HAIR LENGTH:



1 Short 2 Medium 3 Long

13. (I.) GERM (EMBRYO) SIZE:

1 Small 2 Midsized 3 Large

13. (D.) SEED CREASE WIDTH:

1 Narrow 2 Mid-wide 3 Wide

13. (D.)SEED CREASE DEPTH:

1 Shallow 2 Mid-Deep 3 Deep

REPRODUCE LOCALLY. Include form number and edition date on all reproductions. FORM APPROVED - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued *(7 U.S.C. 2421)*. The information is held confidential until the certificate is issued *(7 U.S.C. 2426)*.

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Oklahoma Agricultural Experiment Station (OAES)	OK03918C	Centerfield
4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	**5. TELEPHONE** *(Include area code)*	**6. FAX** *(Include area code)*
Oklahoma State University 139 Ag Hall Stillwater, OK 74078	(405) 744-5398	(405) 744-5269
	7. PVPO NUMBER #200700390	

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain.** ☑ YES ☐ NO

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? **If no, give name of country.** ☑ YES ☐ NO

10. Is the applicant the original owner? ☑ YES ☐ NO **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?
☐ YES ☐ NO **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?
☐ YES ☐ NO **If no, give name of country**

11. Additional explanation on ownership *(Trace ownership from original breeder to current owner. Use the reverse for extra space if needed)*:

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT F
DECLARATION REGARDING DEPOSIT

NAME OF OWNER (S)	ADDRESS *(Street and No. or RD No., City, State, and Zip Code and Country)*	TEMPORARY OR EXPERIMENTAL DESIGNATION
Oklahoma Agricultural Experiment Station (OAES)	Oklahoma State University 139 Ag Hall Stillwater, OK 74078	OK03918C **VARIETY NAME** Centerfield
NAME OF OWNER REPRESENTATIVE (S)	**ADDRESS** *(Street and No. or RD No., City, State, and Zip Code and Country)*	**FOR OFFICIAL USE ONLY** **PVPO NUMBER** #200700390
	Oklahoma State University 139 Ag Hall Stillwater, OK 74078	

I do hereby declare that during the life of the certificate a viable sample of propagating material of the subject variety will be deposited, and replenished as needed periodically, in a public repository in the United States in accordance with the regulations established by the Plant Variety Protection Office.

Clarence Watson by Sheila Julian
Signature

6-26-07
Date